Collateralized Mortgage Obligations: Risk in the Derivatives Market

by

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This thesis is dedicated to two individuals whose generous assistance made this work possible: Professor Richard Murdock and my father, Carl Tuss. Thank you for inspiring my courage and confidence.

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Introduction

Derivative instruments bear a striking resemblance to a double-edged sword. While some investors made fortunes using these financial tools, others have experienced economic ruin. As a result of some surprisingly large losses incurred by a wide variety of investors, many companies are reconsidering their risk management methods. Accordingly, the dollar volume of derivative sales declined by 94% for the first quarter of 1995 (Norris 1995).

This decline in derivative sales is due to both big losses and the bad publicity surrounding derivatives litigation (Norris 1995). Small public institutions, as well as companies with millions of dollars in assets, became losers. For example, Orange County, California lost $2 billion in 1994 using derivatives (Zuckerman 1995). In the same year, Proctor & Gamble, which employs a risk management committee, lost $157 million (Loomis 1994).

As a result of such losses, many lawsuits have followed. For example, Proctor & Gamble has filed a suit for $130 million, plus unspecified punitive damages, against the purveyor of its derivatives, Bankers Trust. The management of Proctor & Gamble claimed it was misled in the purchase of high risk derivatives (Loomis 1994). Bankers Trust claims the deal was not unique and that Proctor & Gamble fully understood the risks involved. Lawsuits such as this one raise complex legal issues which may remain

unsettled for quite some time. Regardless of the outcome, these lawsuits may have slowed down the market enough to allow regulators to catch up.

Although the role of derivatives in the future remains unclear, it is likely these instruments are here to stay. According to Fortune, a survey of 200 Chief Executive Officers (CEO) from Fortune 500 companies revealed that 92% of these companies will continue to use derivatives to some extent (Pare 1994). Thus the business community must attempt to arm itself against further losses. The question remains: how?

Sweeping regulation may only drive the derivatives market off-shore. Promoting an increased understanding about derivatives and their risks is the most beneficial way to control losses in the near future. In the same Fortune survey mentioned earlier, 40% of CEOs feel there is a need to increase education about derivatives (Pare 1994). A better understanding will begin to correct errors occurring in the derivatives market.

Two types of errors occur in the derivatives market. The first type, an *error of omission*, occurs when an investor fails to analyze sufficiently the instrument before purchasing it. The second, an *error of commission*, results from accepting inappropriately high degrees of risk in an attempt to reap short-term benefits. Importantly, we cannot continue to escape responsibility: the business community must assign accountability to correct these errors and understand derivatives as a risk management tool.

Therefore, this work intends to promote a better understanding of derivatives for a novice investor. Specifically, the author has selected collateralized mortgage obligations as a focus. First, this paper will address the growth of the derivatives market, along with the reasons for the growing concern surrounding these instruments. Next, the paper will

cover the emergence of one of the most complex derivatives, the collateralized mortgage obligation (CMO). Material addresses the structure and inherent risk characteristics of a CMO within an educational framework. Finally, this paper will present two case studies designed to exemplify the two types of errors in the derivatives marketplace, and the legal issues such errors raise.

The Growth of the Derivatives Market

A derivative is defined as "a financial contract whose value depends on an underlying asset, index, or reference rate" (Saul 1994). Derivatives exist as both exchange-traded contracts and privately negotiated contracts between a dealer and an end user. Exchange-traded contracts (refereed to as *plain vanillas* by derivative traders) are the futures and options contracts listed on supervised exchanges. Privately negotiated derivatives (known as over-the-counter derivatives (OTC)) are customized contracts, such as interest rate swaps, arranged between two parties (McGee 1995). (An interest rate swap is an agreement between two parties to exchange different types and/or rates of interest payments for a specified period of time.)

Exchange-traded derivatives have their origin in the late 17th century. The first treatise on futures contracts, options, hedging, and all the paraphernalia of markets in contingent claims was Joseph de la Vega's Confusion de Confusiones. Published in 1688, it was intended for the edification of the members of Amsterdam's Portuguese Jewish community who were actively trading shares of the Dutch East India Company after 1650

(Hanke 1994). Since this time, exchange-traded derivatives have grown to be a major force in the global market.

The trillion dollar over-the-counter derivatives market was born in the early 1980's as Wall Street quantitative wizards devised new products to manage risk (Greenwald 1994). The driving force behind these developments was the increased need to manage risk on an international level. Emerging economies in Latin America, China, and the Pacific Rim generated a strong desire for American capital. However, potential investors faced risk from exchange rate fluctuations. Wall Street seized the opportunity to make money by designing and issuing OTC derivatives to underwrite investor risks (Greenwald 1994).

The potential for a customized product contributed greatly to the growth of derivatives. Wall Street quantitative wizards can generate products to serve virtually any customer need. Financial experts found ways to expand the base of the underlying collateral used for derivatives. Currently, investment houses securitize mortgages, credit card receivables, and even aircraft leases. The process of securitization occurs when an issuer pools loans into standardized securities backed by these loans, and these new securities can then be traded (Bodie, Kane, and Marcus 1989). In 1994 the notional amount (the amount of the underlying principal) of the derivatives market reached $36 trillion dollars; equal to three-quarters of the world's stocks, bonds, and money-market securities (Smith 1994a).

The influx of computer technology into the financial markets facilitated the creation of derivatives. Computer experts design and monitor risk assessment models to

hedge or speculate on minute changes in interest rates (Greenwald 1994). With the advent of a global marketplace, trading occurs 24 hours a day. The ability of computers to track quickly gigantic volumes of product offerings provided a necessary spark in customized product growth.

Given this availability of product offerings, investors are very willing to buy. According to the Wall Street Journal, 40% of American companies operate their treasury departments as profit centers, many using derivatives to enhance returns (Smith 1994a). As Columbia Business School finance professor Bruce Greenwald states, "The fundamental advantage of derivatives is that they let you buy the risks you want and hedge the risks you don't want, and that is an extraordinarily useful function" (Greenwald 1994). Derivatives appeal to investors because they allow one party to pass along unwanted risk to another party who wishes to assume it. Thus derivatives may offer either a conservative or a speculative investment.

For example, interest rate swaps offer investors either a hedging tool or a speculative investment. When using an interest rate swap alone, the investor is gambling on the direction of future interest rates.To illustrate, assume party A agrees to make fixed-rate payments to party B and, in exchange, receives variable-rate payments from party B. If interest rates fall, party A loses money. The value of the variable-rate payments received by party A will decline and party A will be paying party B a fixed-rate payment above the current market rate. A swap also provides a hedged, or protected, position when used in conjunction with a bond portfolio. The owner of the bond portfolio enters into an interest rate swap agreement and makes fixed-rate interest payments to the swap

counter-party. This counter-party then pays then makes floating-rate payments to the owner of the bond portfolio. Entering into the swap agreement while holding a coupon-paying bond portfolio provides a hedged position with respect to interest rate risk (Achstatter 1994).

The Mounting Concern Over Derivatives

Large investor losses, such as the loss experienced by Orange County, California, have made derivatives a dirty word. Today, investing in derivatives is nearly associated with scandalous behavior. According to the chairman of Bankers Trust, Charles Sanford, "Nobody's going to come out and say anything publicly, because they get skewered by the press and everybody else. You know, 'so-and-so's in derivatives'" (Loomis 1995). Why did the derivatives losses provoke such great public concern?

The significant losses experienced by small public institutions and municipalities explains some of this public anxiety. Although Proctor & Gamble lost $157 million, losses incurred by profitable corporate enterprises do not arouse much public sympathy. However, cases such as Escambia County, Florida cause society to take notice. This county's $25 million dollar loss from mortgage derivatives caused the road paving program to be reduced from $21.2 million to $3.6 million with disastrous results. Last year in Escambia County, 100 school buses got stuck in the mud because of the predominance of dirt roads (Knecht 1995). When Proctor & Gamble absorbs a loss the shareholders pay the price. In the case of Escambia County, taxpayers absorb this loss, as

well as the children who can't get to school. These types of far reaching effects have generated concern (Pare 1994).

The controversy surrounding derivatives dealings led to a surge of securities litigation. Several lawsuits have been filed, the outcome of which will shape the future use of these instruments. For example, Bankers Trust, a large dealer in derivative instruments, has been sued by five companies: Proctor & Gamble, Mead Corporation, Gibson Greetings, Carlton Communications, and Air Products. Bankers Trust also faces potential lawsuits from its overseas business as two Indonesian clients struggle with derivative losses (Lipin 1994c). Merrill Lynch has also been heavily criticized and faces a $3 billion lawsuit in connection with the aggressive sale of derivatives to Orange County (Smith 1994b).

More specifically, the critical issue of these lawsuits lies in the conflict between buyer and seller. In many derivative lawsuits, the investors allege that a dealer or broker failed to disclose appropriately the risks associated with the product. The plaintiffs claim they were sold unsuitable products and look to recover damages for incurred losses. The defendants claim no wrong doing in disclosing risks. Meanwhile, the business community waits for the outcome which will surely dictate the course of derivatives sales. "When the legal dust settles, investors and boards of directors will have a much better idea of what they should and should not be doing. That more than anything will provide the market with discipline," says Michael Wiseman, a partner at Sullivan and Cromwell in New York (Knecht, 1994c).

The Nature and Emergence of the Collateralized Mortgage Obligation

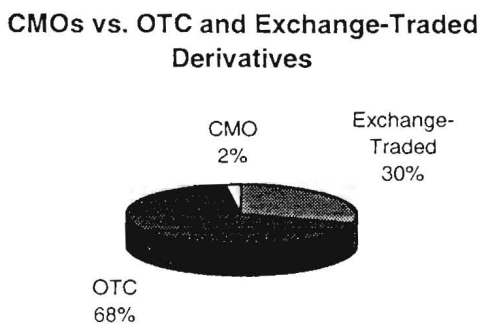
Of all the derivative instruments available, one of the most perplexing and troublesome is the mortgage-backed derivative, specifically the collateralized mortgage obligation (CMO). Because it is so complex, the author has selected this instrument as the paper's focus. This paper analyzes of the origin, structure, and the inherent risk factors needed by a novice investor to assess the behaviors of a CMO. Also, an argument for honest sales practices is vital the business community wishes to diffuse knowledge and understanding to derivative users. A thorough understanding of CMOs is the most effective way to overcome and prevent more of these errors.

The underlying assets of mortgage derivatives are mortgage-backed securities (MBS) which are packaged together and sold as bonds. In essence, collateralized mortgage obligations are derived from mortgage pass-through securities. In its simplest form, a mortgage pass-through security is a debt obligation of the issuer secured by mortgage collateral owned by the issuer (Davidson, Ho, and Lim 1994). That is, the cash flow on the debt obligation is paid using the cash flow received from the underlying mortgage collateral. Thus, the cash flows generated by the mortgage collateral must be sufficient to cover principal and interest payments on the related debt. CMOs are specifically characterized by a multi-class (or tranche) serialized structure. A tranche is one of a group of bonds comprising the CMO structure. Each group of bonds in the structure is serialized and assigned a priority by which the bonds are redeemed. Thus

each tranche receives principal payments according to different maturities (Davidson, Ho, and Lim 1994).

Investor demand for mortgage-backed securities with different times to maturity created a strong CMO market (Bodie, Kane, and Marcus 1989). The mortgage-backed pass-through security was first introduced by the Government National Mortgage Association (GNMA) in 1970. Bank of America made the first private issue of similar instruments in 1977. Creation of CMOs was the driving force in the mortgage-backed securitization in 1983 (Davidson, Ho, and Lim 1994). Wall Street had devised a way to carve up the cash flows of mortgages and create value for investors while generating profits to security issuers. Between 1984 and 1994 the mortgage-backed securities market grew almost tenfold, from $240 billion to an impressive $2 trillion. Currently, the value of CMOs outstanding is $750 billion, representing 2% of total derivatives outstanding (see Figure 1). Moreover, fifty percent of currently outstanding mortgages are securitized (Greenwald 1994).

Figure 1



Source: Smith, Randall. "Beleaguered Giant." Wall Street Journal, 25 August 1994. pA(1).

Using leverage to purchase derivatives helped create the billion dollar CMO market. Leverage is defined as an investment position subject to a multiplied effect from changes in price due to the use of financing (Davidson, Ho, and Lim 1994). A leveraged position is financed through borrowings resulting in a larger risk exposure. Because CMOs offer a higher yield than many other investments, money managers with an opinion on interest rates used leverage as a way to increase their bets. Using leverage to purchase securities with respect to prepayment and interest rate risk on margin provides opportunities for some of the biggest gains. Askin Capital Management pursued this strategy and remained successful until March 1994 when the market turned against Askin (Ehrbar 1994). One author describes speculating with leveraged CMO positions, "In a circus, this would be the equivalent of jacking up a jack that was being used to support a Mack truck. If the stunt works people applaud; if it collapses they run for the doors" (Stone 1994).

Contributing to the explosive use of CMOs is the high degree of customization these instruments offer. CMOs increase the appeal of mortgage-backed securities because they enable investors to find investment structures designed for specific needs. Arbitrage drives the creation of CMOs. Arbitrage is defined as buying a commodity or security in one market and selling the same or similar security in another market, with the purpose of taking advantage of price differentials (Davidson, Ho, and Lim 1994). Due to the high level of mortgage refinancings between 1992 and 1994, issuers had a plentiful

supply of mortgages which they purchased cheaply and turned into CMOs. These CMOs were then sold at premiums to customers desiring particular investment characteristics. Therefore, the type CMO created is highly dependent on both the market conditions and the investor's willingness to pay a premium for a particular type of bond.

Simple sequential cash flow deals in the CMO market are becoming outdated quickly. Ongoing changes in investor demands and the regulatory environment have driven those structuring deals to more complex alternatives in carving up collateral cash flows. For example, in 1987 a CMO structure might have encompassed 5 or 6 tranches, whereas in 1992 this number increased to twenty different classes. Today, a CMO structure can possess one hundred different tranches of mortgage-backed bonds (Fabozzi, Ramsey, and Ramirez 1994). These more complex structures are defined as the "exotics". The possibilities for new CMO structures are limitless and the Wall Street wizards explore and develop new instruments continually.

To many investors, CMOs appear to be traditional AAA rated, fixed-debt securities. This false perception arises because CMOs are derived from securities issued by government-sponsored agencies, such as the Federal National Mortgage Association (FNMA) and the Federal Home Loan Mortgage Corporation (FHLMC). Although these underlying government securities possess a minimal credit risk, the issuer changes their nature by allocating cash flow to different tranches. Consequently, these new derived instruments behave differently than the original mortgage-backed security. Investors' misconception that a CMO behaves similarly to an MBS may partially explain the widespread use of mortgage derivatives.

Investors' attraction to CMOs was intensified given certain interest rate movements the economy experienced. For example, 1992 and 1993 saw the emergence of a huge derivatives market. The 150 basis point (100 basis points equals 1 percentage point) decline of long-term rates throughout 1992 and 1993 created a wave of refinancings. Over this time period, issuances of current-coupon, 30 year, fixed-rate mortgages hit all time highs (Welling 1994). With short-term rates so low, the higher yields offered by CMOs increased investors' demand for this instrument. Also, CMO issues became more profitable because of arbitrage opportunities created by the supply of collateral and a willingness of investors to pay premiums for customized products.

Just as the last buyers were entering the CMO market, the unexpected happened. Rising prices in the commodities market along with signs of an expanding economy caused the Federal Reserve Board to start raising short-term rates in February 1994. In an unleveraged market, the jump in short-term rates might have quelled inflation worries and brought long-term rates down marginally. Instead, the 25 basis point increase in the overnight Federal Funds rate (the rate at which member banks may borrow from the Federal Reserve Bank overnight) triggered a 40 basis point increase in the 30-year Treasury rate because leveraged bondholders were forced to quickly liquidate their bond portfolios to curtail losses (Ehrbar 1994).

As long-term rates rose in response to the increase in short-term rates, mortgage refinancings stopped. The duration of mortgage bonds lengthened and higher rates decreased their value. This interest rate reversal along with market uncertainty caused CMO prices to plummet. At this point panic struck the media, the regulators, and the

market. Bankruptcies appeared, beginning with Askin Capital Management's ruin in March 1994. "Derivative" was officially a dirty word.

Many investors "got caught" because they lacked sufficient insight to gauge their real risk exposure. Certainly, some responsibility falls on those CMO dealers who failed to disclose, or even misrepresented, the risks of CMO products. In other cases, losses were caused by speculative gambles gone bad. A careful analysis of CMO structures and the inherent risks may have saved millions of dollars.

Analysis of the Underlying Mortgage Collateral

Analysis of a simple CMO structure begins with examination of the underlying collateral: the fixed-rate mortgage loan. Essentially, the lender of a mortgage has a claim to a cash flow stream comprised of both interest and principal payments from the homeowner. However, the amount and timing of these payments are uncertain.

The first source of uncertainty arises from interest rate risk. When rates rise, the value of the cash flow generated by a mortgage declines. The converse is true in a falling interest rate environment. A second source of uncertainty arises from credit risk. If a mortgagor cannot or will not honor his/her debt, or if the value of the home mortgaged falls below the balance of the mortgage outstanding, the full principal amount may not be returned to the lender (Stone and Zissu 1994).

The third source of uncertainty arises from prepayment risk. Prepayment risk is born out of the mortgagor's embedded option. A callable mortgage gives the borrower

the right, or option, to refinance his/her mortgage any time prior to its maturity. The mortgagor will exercise this option when the refinancing rate is below the rate of the outstanding mortgage (when it is "in the money"). Exercising this option takes value away from the mortgage lender.

In a declining rate environment, the increase in value of a callable mortgage is reduced by the probability that the mortgagor will exercise the prepayment option ("calling the mortgage"). The value of the mortgage is thus compressed towards par, or "the strike price". This feature is known as *negative convexity* among mortgage traders (Stone and Zissu 1994). How is this risk passed on to a holder of a mortgage-backed security? The mortgagor's call option exposes the mortgage-backed securities investor to the risk that mortgagors will prepay their mortgages at a rate other than the expected rate built into the price of the MBS.

The building block for a CMO lies in the cash flows generated by a mortgage loan. A CMO exists as a series of cash flows which are carved from the cash flows generated by the mortgage. Specific CMO structures reflect the amount and availability of raw mortgage cash flows in the market. Because the refinancings of 1992 and 1993 provided a great supply of cash, Wall Street was able to increase the amount and complexity of its product.

Analysis of Risk Factors Associated with Collateralized Mortgage Obligation

Mortgage derivatives present new investment problems which require different levels of analysis. Investors can no longer apply similar tools to all types of bonds and strategies. The growth in the mortgage derivatives market has magnified the financial consequences of a market move, yet has thwarted traditional investment analysis. Traditional analysis fails because of its focus on economics as opposed to the dynamics of the international market (Ehrbar 1994).

Given today's complex deal structures, understanding these derivatives can prove difficult. How much analysis is necessary? An investor over-analyzing and applying every test may lose the opportunity to make a timely investment decision; the instrument would probably be traded away in this time. Improvements have been made in volatility and suitability measures to help investors judge how much analysis is necessary to feel comfortable with various bond structures. However, further improvements are necessary to increase a buyer's ability to recognize both risk and value.

Most big dealers have sophisticated systems in place to measure and manage complex risks. The 1994 Central Bank Report of the "Group of Ten" member banks identifies the results of such systems as proprietary with respect to the dealers. As a result "a gap exists between the precision with which a firm's management can assess its financial risks and the information available to outsiders, including clients" (Granito 1994). Investors can narrow this gap by identifying the nature and origin of risk assigned

to the deal. Understanding a derivative product requires a focus on basic elements and tradeoffs common to all financial transactions: risk and return. According to John Succo, the managing director of derivatives with Paine Webber in New York, "All derivatives really do is break apart the components of risk of the underlying securities. The problem is that some people who use the derivatives don't understand the components of risk" (Indiana Alumni News 1994).

One of the primary risk characteristics associated with CMOs is the credit risk of the underlying issuer. To an untrained person, CMOs appear very similar to high-yielding government bonds. Although the traditional mortgage pass-through securities from which CMOs are derived may boast high ratings, the issuer buys these securities and changes their structure. As discussed earlier, the resulting CMO represents a new instrument. Thus the credit risk of a CMO depends on the identity of the issuer who bought the MBS securities and carved them up, rather than on the risk of the underlying collateral.

Issuers of CMOs fall into two categories. An issuer is either a government-sponsored entity, such as the Federal Home Loan Mortgage Corporation or the Federal National Mortgage Association, or a private entity. CMOs issued by a government-sponsored agency are known as *agency CMOs* whereas those CMOs issued by a private agency are referred to as *private-label CMOs*.

The credit guarantee of a government-sponsored agency depends upon two factors: the financial ability of such an agency to service its obligations and the willingness of the United States government to rescue this agency should it be incapable

of meeting its obligations. *Private-label* CMOs are rated by commercial credit rating agencies and necessitate investigation prior to purchase. Furthermore, those buying *agency* CMOs must remember that although the government may guarantee the credit of the underlying collateral, the real risks arise from when homeowners pay back their mortgages, for which there is no guarantee.

The question of "when" gives rise to the most perplexing risk component of a CMO. The cash flows generated by a mortgagor paying off a mortgage can be broken into three ingredients: the principal repayment, the interest portion, and any payments in excess of the regularly scheduled principal payment. This last element, the prepayment portion, represents an unknown variable.

In examining prepayment risk, it is helpful to consider the creation of a CMO. An individual investor who buys a mortgage loan faces the prepayment risk from that one mortgage. However, if an issuer buys twenty mortgages and pools them, the issuer could fund its purchase by using this pool as collateral for the issuance of mortgage pass-throughs. The cash flows associated with the mortgage pass-throughs would be based directly based on the cash flow generated by the twenty mortgages. Thus, an individual investor could now invest in a mortgage pass-through security which exposes him or her to prepayment risk spread over the twenty mortgages. The total amount of prepayment risk remains unchanged. (Fabozzi, Ramsey, and Ramirez 1994).

CMOs allocate this prepayment risk unequally to different investors. Instead of distributing principal on a pro rata basis, principal is distributed on a prioritized basis. Various classes of bonds are created with the sum of their total par values equal to the

original price paid for the mortgages. Each class of bond is further subdivided into units which are sold and receive a proportionate share of the payments received by this class of bond.

Complexity arises because of the rules determining when each class of bonds will begin receiving payments. For example, assume class X must first receive all principal payments and prepayments until its par value is met before class Y begins receiving principal payments (known as "paying down"). The behavior of class Y depends on the behavior of class X, which in turn depends on how fast homeowners pay off their mortgages. One CMO may contain any combination of rules dictating the amount and timing of principal and interest payments to be allocated among the various bond tranches. Although the rules may seem simple, the resulting instrument may be very complex because it combines the effects of many different rules over dozens of tranches of bonds.

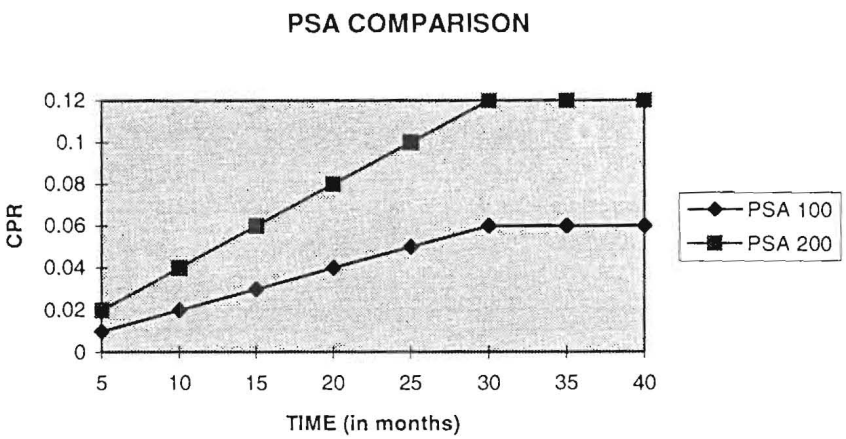
Evaluating the prepayment risk of a CMO begins by using a basic measure, the PSA speed. Adopted by the Public Securities Association (PSA) in the mid-1980s, the PSA is a market convention which assumes prepayment rates, expressed in a conditional prepayment rate (CPR), follow a standard path over time. (The CPR is a percentage prepayment rate which relates outstanding balance prepaid on an annualized basis.) A 100% PSA curve assumes the prepayment rate starts at .2% the first month and rises by .2% until the thirtieth month when it levels off at 6% (See Equation 1). The baseline assumption PSA is 100% and faster speeds are expressed as multiples of the base model.

For example, a 200% PSA means mortgage loans will rise to 12% over the thirty month period (see Figure 2).

Equation 1

$$PSA = \frac{\text{conditional prepayment rate}}{\min(\text{age } 30) \times .2}$$

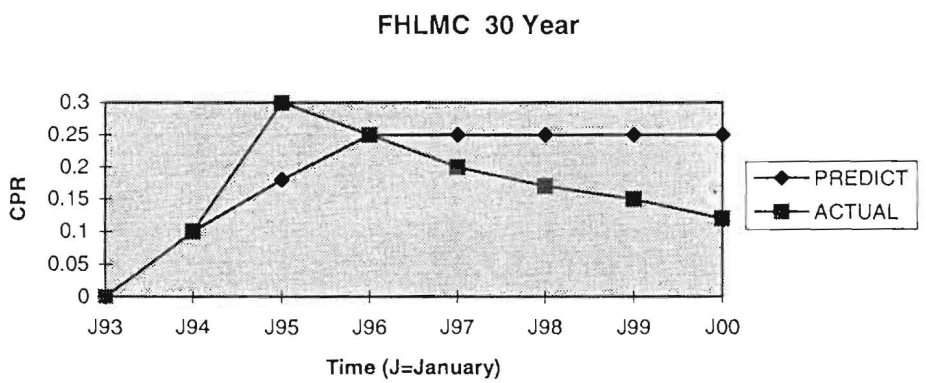
Figure 2



Traditionally, mortgage securities were analyzed using static prepayment analysis. A static analysis consists of forecasting prepayments based on a long-term average PSA model. However, evaluating a complex CMO structure based on a long-term average in a volatile market proved fatal for some CMO investors. One author equates the PSA model to a "funhouse mirror; the PSA model distorts reality and makes meaningful comparison difficult" (Davidson, Ho, and Lim 1994).

The long-term PSA forecast is inaccurate for two reasons: the *aging flaw* and the *burnout flaw*. The *aging flaw* arises because the PSA model normally assumes that all mortgages take thirty months to reach their peak CPR. Unfortunately, we know from experience that all loans age differently, and thus the PSA curve does not accurately fit the aging patterns of all loan pools. Figure 3 shows how the aging period for prepayments on a 7% FHLMC Gold 30-year MBS (the underlying collateral of the CMO consists of 30-yr MBS issued by the FHLMC with a 7% coupon) originated in March 1993 was significantly shorter than the PSA model predicted.

Figure 3

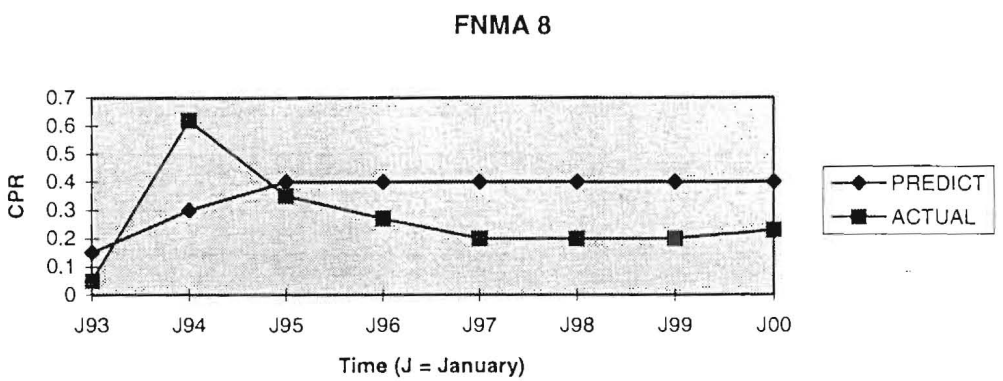


Source: Davidson, Andrew, Thomas Ho, and Yung Lim. Collateralized Mortgage Obligations.(Chicago: Probus Publishing, 1994) 106.

The *burnout flaw* of the PSA model arises because of the assumption that prepayment rates will remain constant after thirty months. Most likely, prepayments will begin to fade after hitting a peak prepayment level. Figure 4 shows the prepayment pattern for Federal National Mortgage Association 8s (8% coupon MBS collateral issued

by the FNMA) plotted against the PSA model. The significant differences between the two lines should indicate to an investor that PSA predictions cannot be trusted.

Figure 4



Source: Davidson, Andrew, Thomas Ho, and Yung Lim. Collateralized Mortgage Obligations.(Chicago: Probus Publishing, 1994) p106.

How do the flaws embedded within the PSA prepayment model generate problems for investors? Without an accurate model from which to predict prepayments, the investor has little foundation on which to gauge the duration of the CMO investment. An environment of increasing prepayment speeds will return money much faster than expected, exposing the investor to reinvestment risk. Conversely, an investor may find the duration of a CMO greatly extended in a slowing prepayment environment. During 1992 and 1993 declining interest rates caused investors to pay back mortgages quickly, making it difficult for investors to hold onto assets. Therefore, many CMO investors simply dumped more money into mortgage derivatives rather than face investing in a

lower yielding market. When interest rates suddenly increased in 1994, the duration of the CMO bonds extended and their value plummeted.

It was not the flaws in the PSA prepayment model alone which generated unanticipated risk. The extraordinary interest rate movements between 1992 and 1994 created prepayment whipsaws. A whipsaw is a sharp movement followed by a quick reversal. These whipsaws were created by the tendency of prepayments in a volatile market to peak one month and decline the next. Whipsaws create certain behaviors in CMO structures which cannot be predicted by long-term average forecasting.

For example, bonds designed to support the call and extension risk generated by prepayment levels in a CMO structure are known as the support tranche. This class of bonds only begins receiving principal payments after the primary classes have been paid down. Because these bonds support more risk (due to longer dates to maturity), they are significantly affected by high PSA levels and whipsaw scenarios. The PSA model erroneously assumes that a forecasted speed of 900 PSA for one month and a speed of 300 next month results in the long-term performance of a CMO structure guided by an average PSA speed of 600. However, the high level of prepayments within the first month will have caused certain of the bonds in the structure to receive unexpectedly high cash flows (as dictated by the rules) and may have resulted in some classes paying down entirely. In the next month of slowed prepayments the structure will behave much differently. Because some tranches of the structure have been paid down, the remaining classes are exposed to extension risk. Yet this exposure is completely hidden if analyzed under the static forecast of a 600 PSA level (Davidson, Ho, and Lim 1994).

The sensitivity of CMOs to prepayment whipsaws may leave an investor holding an investment whose nature resembles little of the original purchase. One author describes the whipsaw phenomena to a pilot flying into a "100 mph headwind. However, he (the pilot) concludes that he can still make the trip according to the planned schedule since he would have a favorable 100 mph tailwind on the way back. Is he right? No, because he would require. . . (twice as long) for the first part of the trip" (Davidson, Ho, and Lim 1994). Therefore, the effects of a current prepayment surge may not be offset in later times of slowed prepayment levels.

One method of forecasting, called vector analysis, presents a more accurate picture of CMO performance. A vector is a course or direction, and thus a vector analysis examines the behavior of a CMO under different prepayment directions. Using vectors reflects more precisely the effects of prepayment volatility and thus changing cash flows. Moreover, vector analysis recognizes that the allocation of cash flow is not a simple question of "when" they will occur. It allows for an examination of a variety of scenarios.

Vector analysis begins with examining the bond's performance over a wide range of prepayment scenarios. For example, it might consider what happens when rates go up or down 150 basis points and then reverse direction (Welling 1994). Prepayment vectors reflect performance under short-term prepayment expectations, long-term forecasts, and volatility under whipsaws. Investors should observe how the duration and value of the bonds in a CMO structure change given a variety of scenarios before deciding to use this instrument.

Investors can develop a simple vector analysis with several rules of thumb. Analysis of a CMO's performance should include at least three scenarios. The first scenario should represent the current month CPR rate as forecasted by the PSA. The second should represent an increase to the highest likely prepayment speed for the collateral given market conditions. Finally, a third scenario should use the long-term average projection (Davidson, Ho, and Lim 1994). Any analysis of a CMO over a series of vectors will be more useful than a constant PSA evaluation. The concept appears simple, yet many losses arose from the failure to predict CMO behavior in a changing rate environment.

The optionality embedded in the underlying mortgage collateral presents complex valuation considerations for the investor. A mortgage-backed security's performance is akin to owning normal bonds but selling interest rate calls against them. (A call is the right to buy an asset at a specified exercise prices on or before an expiration date.) These calls give the fixed-rate payer the right, but not the obligation, to prepay at any time. Because this fixed-rate payer only has incentive to exercise this option when rates fall and such an action is detrimental to the MBS investor, the investor demands a high yield. The valuation of a CMO revolves around these option-related components, or the ability of the borrower to changes the expected pattern of receipt of cash flows, and thus change the value of the instrument (Welling 1994).

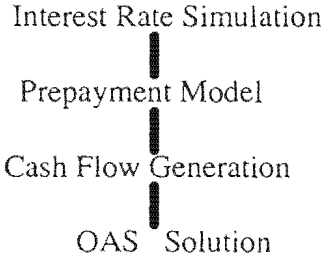
Various analytical methods exist for valuing a CMO, ranging from basic cash flow analysis, to advanced spread and return techniques. The option-adjusted spread (OAS) model provides a method for valuing CMO bonds based on the Treasury yield curve. By

incorporating the value of options embedded in a mortgage bond's structure, the OAS model turns a risky CMO bond into a "Treasury equivalent" (risk-free government bond). The difference between the CMO bond and the analogous risk-free bond represents compensation for the credit risk assumed by the holder of the debt (Klein and Lederman 1994).

The option-adjusted spread computation has four inputs: the interest rate simulation, the prepayment model, the MBS cash flow generation, leading to the OAS solution. Figure 5 depicts this process. Given that dealers possess varying methods for generating these inputs, the OAS process fails a consistent gauge of relative value (Klein and Lederman 1994). This paper will not examine further the intricate details of optionality analysis; the point is simply to show how even such an advanced method of analysis fails when applied to CMOs. [1] Says Deborah Midanek, a fixed-income manager with Solon Asset Management in California, "These securities were complicated enough and had enough different kinds of optionality in them that even really sophisticated analysis OAS didn't help that much. And besides that area is a black box for most people" (Welling 1994).

Figure5

OAS Model



Because CMOs possess complex risk characteristics, liquidity risk becomes another significant concern. As interest rates started rising early in 1994, CMOs plummeted in price and the gamblers who had bought them, often with borrowed money, had to dump them quickly, driving prices even lower. Furthermore, the customization of CMOs often make them unattractive and difficult to price. All the computer pricing models are worthless in a panicked market of sellers.

With such liquidity risks, it is possible, and frightening , that a CMO investor could lose everything before being able to act. According to the World's Central Bank Report, "During episodes of market stress this lack of transparency can contribute to an environment in which rumors alone can cause a firm's market access and funding to be impaired" (Granito 1994). From February to December 1994, the mortgage market experienced tremendous volatility and still suffers from decreased liquidity, especially for the more exotic varieties. Dealers are not quoting prices with the same frequency, bids are scarce, and sometimes at extremely low values as compared to the theoretical model values (Goodman 1994).

Case Studies

After discussing the significant risks which an investor assumes when buying a CMO, this paper will now discuss two examples of errors in assessing these risks. The first case is the unfortunate story of Odessa College in Texas. Due to an error of commission this college has experienced serious losses. The second case will discuss

how an error of omission can harm CMO investors. Unethical sales practices, in combination with uneducated and unsophisticated investors, has generated financial setbacks for several Ohio municipalities and legal action against several salesmen from Hart Securities in Houston, Texas.

I. Error of Commission : Gambler's Anonymous?

Odessa College is a two-year public institution of higher learning located in West Texas. For most of the college's history, it pursued a conservative investment strategy using bank certificate of deposits and maintaining enough cash to cover several months of operating costs. However, in 1990 because of a desire to renovate the campus and offset a decline in other revenues, the college departed from caution.

Dr. Roger Coomer, vice-president of finance, was in charge of virtually all the college's resources: long-term investment funds, proceeds of bond sales, state payments, tax revenues, tuition payments, even funds belonging to the booster club. In 1990, he began to invest these funds in complicated mortgage derivatives. Eventually, the portfolio Coomer managed consisted of CMOs including a portion made up of exotic CMOs known as principal-only strips. (A principal-only strip only entitles the holder of the CMO to the cash flows resulting from repayments of principal on the collateral.) These derivatives were bought from a variety of dealers, including Gruntal and Company, Government Securities Corporation, and Westcap Corporation (Knecht 1994b).

Initially, Coomer's strategy worked. In fiscal 1991, he earned $1.5 million in interest and capital gains on Odessa College's investment for an eleven percent return. In

fiscal 1992 he earned $3 million for a seventeen percent return, and 1993 brought a $4.1 million gain for a hefty twenty-three percent return. Encouraged by this success Coomer continued to add to his derivatives investment. By the close of 1993, Odessa College derivative position effectively made a huge bet that interest rates would continue to fall (Knecht 1994b).

Investing money and portfolio management was not a new concept to Dr. Coomer. While pursuing his doctorate in education, he wrote a doctoral thesis on investing money for educational institutions. The thesis titled "The Development of Financial Strategies to fund Capital Projects for Texas Community Colleges" was accepted by Texas Tech University in 1992 (Knecht 1994b). Coomer was sophisticated enough to price-shop among several dealers, and could identify specific securities he wanted rather than seeking consultation: "Unlike many customers, he would tell us exactly what he wanted down to the cusip number," says one broker who sold products to Coomer (Knecht 1994c).

Coomer managed his portfolio in a manner indicative of a sophisticated trader seeking big returns rather than stability. Coomer handled his risky portfolio with the approach of a short-term trader. For example, during 1993 he bought $90 million of mortgage derivatives which he resold before the end of the year. According to Frank Klaus, a dealer with Government Securities Corporation, "He was buying to trade, not for the long-term." (Knecht 1994b). Government Securities was so impressed by his expertise and initial success that it even invited him to speak at a seminar for institutional investors it held in October 1993 (Knecht 1994b).

Notably, in July of 1993 several of the college's trustees expressed concerns and Coomer agreed to reduce the college's risk exposure. This proved to be a short-lived agreement as Coomer added $12.7 million of derivatives to the portfolio between September 30 and December 30, 1993 (Knecht 1994c). Even some of the brokers who made money selling derivatives to Coomer thought he held too much risk. Senior managers with Government Securities Corp. expressed concern that Odessa College's assets were too concentrated. "He gave us the general message that he knew what he was doing," says Klaus (Knecht 1994b). The concern of another one of Coomer's dealers, Coastal Securities, prompted the firm to require Dr. Coomer and the college's president to sign a waiver certifying they understood the risks and volatility of the mortgage derivatives they purchased.

Just after Coomer's last buying spree, rates began to rise in early 1994. As Odessa College's portfolio dropped in value, colleagues claim Coomer became uncommunicative. Finally on March 21, 1994, Coomer revealed to the college's president that its financial situation was critical. One week later he sold $6.3 million of derivatives for a $2.7 million loss. In the weeks to follow, the remaining investments declined in value and became too difficult to sell at any price (Knecht 1994c).

Over this time period, Odessa's $21.9 million portfolio declined to half that price. By October 1994, Odessa had added an additional $10 million in debt and still had the derivatives. As a result of its investment strategy, the college increased tuition by twenty percent and borrowed $10.5 million on an emergency basis. Twenty-two senior professors received early retirement and the college president, Phillip Speegle, is forgoing

his $122,000 salary. Even the air conditioning was eliminated, in an environment where temperatures climbed over 105 degrees for sixteen days in July. Unfortunately, the complex and abstract world of mortgage derivatives will be very real for the students forced to swelter through uncomfortable classroom conditions (Knecht 1994b).

As a result of these losses, the college filed a lawsuit against one of its derivatives dealers, Gruntal and Company. In the lawsuit, Odessa College claims that Gruntal and Company failed to disclose the potential volatility and inherent risks of $2.8 million of derivatives sold to the university. While Dr. Coomer himself has not been accused of any improprieties, he has disappeared. Gruntal and Company claims that Dr. Coomer was inarguably sophisticated enough to understand the risks he was taking and cites the claim as "devoid of merit" (Knecht 1994b).

The manner in which Dr. Coomer managed his portfolio reveals his losses resulted from errors of commission. Associates claim Coomer was eager to impress colleagues and dealers with his skill, and although he hasn't been located, administrators have acknowledged that Coomer knew his impressive returns were related to increased risks. Rising interest rates slowed prepayments on mortgages and caused the duration of Odessa College's CMOs to lengthen and lose value. A liquidity crunch exacerbated losses as Coomer was unable to find buyers for his investments.

Coomer was certainly knowledgeable enough to have predicted such a scenario. Yet for some unknown reason, he simply continued to "bet the college" based solely on his opinion about interest rates and previous returns. According to Sue Blair, faculty president at the time, "he thought everything he touched turned to gold" ("Local Heroes,

Wall Street Journal, 1994). In hindsight, using highly volatile and risky mortgage derivatives to enhance short-run returns was clearly an inappropriate strategy for a small public college. Any institution which cannot absorb the risks or afford the potential losses should not invest so heavily in such instruments. Solving the derivatives problem requires the exercise of solid judgment above impulsiveness. It is not enough simply to have knowledge and expertise about CMOs; one must apply such knowledge in a constructive and effective manner.

II. Error Of Omission: Look Before You Leap

Unlike Odessa College which had a knowledgeable fund manager, several Ohio school districts invested in mortgage derivatives without sufficient understanding and later incurred troubling losses. Furthermore, dealers responsible for some of the sales employed misleading sales practices designed to belie and mask the risk components. This error of omission presents a dual responsibility; that is, assessing blame to only one party is misleading. Buyers of securities have an obligation to their organization to refrain from assuming risks they don't understand. Dealers, however also have a responsibility for honest disclosures and suitable sales practices.

Unexpected by most taxpayers, some of the institutions hit hardest by derivative losses have been municipalities and school districts. These institutions, under intense pressure to raise funds, may unadvisedly assume derivative risks. Municipalities routinely place idle cash raised through taxes and public borrowings in investment accounts to earn extra revenue. When rates fell in 1992 and 1993 many municipalities

bought riskier investments and longer term securities to earn a higher yield. Furthermore, treasurers often find themselves under considerable pressure to earn a higher return as opposed to raising new taxes. Such pressure from the community often puts fund managers in an awkward position.

Hart Securities of Houston, Texas, a broker in mortgage derivatives, played upon such pressures and misunderstandings to sell several Ohio school districts a variety of CMOs. Hart Securities, along with several other Houston based firms, played a crucial role in enabling Wall Street to build the $2 trillion mortgage security market. The Houston firms provided a constant demand for mortgage derivatives that Wall Street could not sell to large institutions. The regional brokers bought these remaining CMOs and sold them to small, unsophisticated institutions and municipalities.

Salespeople at Hart were required to make at least four attempts to close a sale during every call. Whenever a customer hung up, the salespeople called right back. Mr. Hart claims he has been very successful by training his salesforce never to take "no" for an answer. One former Hart salesman, Eric Lackshen, says all new salespeople (who were usually new to the securities industry as well), had only four days of training before receiving a list of prospects. Since compensation was based solely on commission, the pressure to sell was intense. Mr. Lackshen, who had previously worked as a used car salesman, initially worried that his lack of training ill-equipped him to talk about securities with clients. However, he quickly realized that the clients were not very sophisticated: "Most of them didn't know anything beyond what a CD was" (Knecht 1994f).

As previously stated, the pressure tactics employed by Hart's salesforce often included misrepresenting the risks associated with CMOs. Houston salespeople, for example, either did not understand or refused to mention the risk components associated with evaluating and valuing CMO behaviors. One former salesman presents the sales pitch he used to sell mortgage derivatives to small towns and institutions. The selling point obviously misrepresents the credit risk associated with a CMO and implies a deceptive amount of safety.

> "This is Patrick McLaughlin with Hart Securities. I hadn't anticipated calling back so soon, but my trader showed me something so exceptional I had to call you. You're familiar with Fannie Maes aren't you? Then you are aware that Fannie Maes are backed by the full faith and credit of the US government. aren't you? Then you're comfortable with the safety of these securities, aren't you?" (Knecht 1994f)

Rosalie Townsend, treasurer of the public schools in Vermillion, Ohio, began receiving calls from Kenneth Schulte of Hart Securities in August 1991. In November 1991, Mr. Schulte eventually sold $200,000 of securities to Vermillion which Rosalie Townsend accepted as being FNMA securities. In their negotiations, Ms.Townsend specifically told Mr. Schulte that security of principal was vital, and he assured her that these instruments were safe. However, when the district sold these CMOs in October 1993, it recouped only $16,000 of its original $200,000 investment (Knecht 1994f).

In actuality, Hart Securities sold Vermillion risky CMOs known as interest-only strips. (An interest-only strip entitles the holder of the CMO to the cash flows resulting from interest payments on the underlying collateral.) Mr. Schulte did not disclose how sensitive these instruments could be to changing interest rates. Vermillion did not research the nature of its purchase enough to realize that it was only entitled to the

interest portions of the underlying mortgage cash flows. As prepayments accelerated in 1993 refinancings evaporated the underlying mortgage collateral, and thus interest cash flows disappeared as well.

After the Vermillion troubles, the Securities and Exchange Commission filed suit against Schulte. The SEC seeks an injunction against Schulte from continuing his controversial sales practices of describing mortgage derivatives as "safe and secure" and as "guaranteed by the US government" (Bailey 1994). This case represents the first action taken by the SEC against a broker for selling these types of derivatives to a public body. The SEC called Schulte's behavior "egregious, given the amount of money lost and the lack of sophistication of the municipal investors. . ." (Rutchick 1994). Mary Keefe, regional director of the SEC in Chicago, claims this suit is part of a larger investigation into improper sales of risky securities to municipalities across the country. As for Mr. Schulte, he is currently selling mortgage derivatives for another brokerage firm in Florida and still contends that derivatives "are easy to understand and. . . do not entail a large degree of risk" (Bailey 1994).

Legal Issues

The outcome of the derivatives litigation will certainly set the course for future derivatives sales and transactions. These lawsuits will largely turn on two questions: did the dealer clearly disclose the risks of the derivative and was the CMO appropriate and

consistent for the buyer's investment scheme? As for the first issue, the answer lies in determining what types of disclosures are the responsibility of a dealer. Disclosing risks of a CMO investment should include presentation of the impact of changing scenarios, or a "stress test", such as a vector analysis. Furthermore, sellers should show customers which valuation model the dealer agency uses, and explain why it selected the specific inputs for that model (Welling 1994).

It is important also to present information about derivatives in understandable terms. An interview with a Big Six accounting firm partner revealed that a derivatives dealer will often present a legal prospectus and respond truthfully to questions when asked. Yet the terms used in the response and the legalistic format is too confusing for the investor to gain a proper understanding of the risks involved (Audit Partner, 1995). Presenting this information in easy to understand terms will reduce the research time required of the investor and, ultimately, the time and expense spent on litigation.

Introducing swift liability for dealers with unethical sales practices may prove difficult under today's legal code. Until new regulations involving sales practices are passed, no foundation exists for proving derivatives fraud. To date, standards concerning the sale of derivatives are ambiguous at best. Section 10(b) of the 1934 Securities and Exchange Act[2] declares it unlawful "for any person. . . to engage in any act, practice, or course of business which operates or would operate as a fraud or deceit on any person, in the connection with the purchase or sale of any security " (Pany and Whittington 1991). However, most derivatives do not currently fall under the normal definition of a security which negates the usefulness of Section 10(b).

Evaluating the responsibility of a dealer to assess the suitability of particular products for its customers introduces complicated legal issues. Clearly, Mr. Schulte of Hart Securities failed to provide risk disclosures. Should he, however, be required to assess whether it was appropriate for Rosalie Townsend to invest in CMOs at all? The answer to this question lies in the nature of the relationship between firm and customer. If the relationship includes providing both financial advice and derivative products, the broker/dealer may arguably be expected, by virtue of the advisory relationship, to make sure the customer understands the workings of the investment and its place in risk management strategy. If not, the customer may have to fend for his or herself.

Debate is heated over the issue of customer/product suitability. An interview with Mike Dontje, head of derivatives operations with Society KeyCorp in Cleveland, Ohio, reveals both sides of the argument. Dontje believes that certain ethical sales practices should be implemented to protect customers, "You can't sell a thirty-year bond to a ninety-year old man." However, it is a buyer's responsibility to determine risk strategy (Dontje 1995). Big Six accounting partner, Michael Joseph of Ernst & Young states, "I don't think it's the dealers responsibility to determine how much risk a corporation should have" (Achstatter 1994). The Wall Street Journal recently surveyed 100 treasurers and CEOs to determine whether the dealer, end-user, or both should be responsible for analyzing risk. Only thirteen percent of the respondents thought it was the dealers responsibility, whereas 57% said it was a shared responsibility ("Derivatives Risk Should Be Shared", Wall Street Journal, 1995).

Examination of the buyer/seller relationship reveals many sources of problems in the derivatives market. When buyers establish what Dontje calls "too cozy of a relationship" with the dealers, they may lose the ability to be objective (Dontje 1995). A mistake of small investors may be a failure to get competitive bids. On the other hand, financing a client's purchase may open the door to liability. For example, Merrill Lynch is now being sued for its extensive involvement with Orange County, California. Merrill Lynch underwrote a $600 million note issue, the proceeds of which were used to purchase more risky derivatives, expediting Orange County's bankruptcy. The reliance on Wall Street to play all roles in the mortgage derivatives market may conflict with the independent check and balance system found in other markets. For the derivatives market, Wall Street is the originator, issuer, seller, and underwriter; all it needs is investors' money to buy the product (Welling 1994).

Despite the arguments presented above, it appears as if dealers may have to accept more responsibility for assessing product suitability for their derivative customers. A recent circular on derivative transactions issued by the Comptroller of the Currency suggests that an institution may have an obligation to provide disclosure about the product and to assess the appropriateness of the transaction for the customer. Implicit in this document was the possibility of incurring a liability for the failure to do either (Wiseman and Simmons 1994). Putting new responsibility on the dealers should not, however, impact the buyer's degree of research, evaluation, and even skepticism. Buyers should be warned that the dealer's goal is not simply better client relations, but to move its product and increase its own wealth.

Conclusion

The shockwave felt throughout the financial markets from mortgage derivatives was not predicted by Wall Street's best and brightest. Big losses resulting from the Federal Reserve's 1994 increase in short-term interest rates were unexpected. The Fed's raise in interest rates was only intended to slow inflation slightly (Millman 1995). Yet, because so much money hinged on mortgage cash flows, the market saw unexpected results. Never before had the prepayment whims of homeowners affected such a large sphere of influence.

The breakdown of previously well-understood market relationships confirmed a hidden fear of the financial community. That is, no one really understood or could predict the financial markets anymore.

> "No one had really paid much attention to the mortgage securities market before. Now it was driving the monetary transmission vehicle . . . The old rules no longer applied. It wasn't just that the markets had gotten bigger or more volatile. The markets were behaving in ways that no one had ever predicted they could" (Millman 1995).

Alvin Toffler's 1970 book Future Shock is a prediction of what has come to pass. Toffler explained technology as a function of knowledge and, thus, the more we know, the more we create. Mortgage derivatives are financial creations of our quickly expanding knowledge and technology. The problem remains exactly as Toffler predicted: innovations cause change at a rate faster than society can absorb.

Regulators have struggled to keep up with the innovations in the derivatives market. In March 1995, the Securities and Exchange Commission (SEC) reached an agreement with Wall Street's six largest securities firms: CS First Boston, Goldman Sachs, Lehman Brothers, Merrill Lynch, Morgan Stanley, and Solomon Brothers. This voluntary agreement set tighter controls on derivatives sales and trading (Taylor 1995). These securities firms agreed to make regular disclosures to the SEC about their internal risk management approaches. Importantly, these investment houses also agreed to give written statements highlighting the risks of derivative instruments to all customers purchasing derivatives. This agreement may indicate further regulatory efforts by the SEC are close at hand, but currently the SEC has no power to enforcement this voluntary compromise. According to Henry Hill, a law professor at the University of Texas, "It's really a code of conduct, and it could go a long way toward pre-empting direct legislative action on derivatives by Congress" (Taylor 1995).

The adoption of these standards may lessen the frequency of errors of omission. The standards emphasize that corporate users of derivatives have a responsibility to evaluate the risks of the instruments they buy. However, the agreement also recognizes that customers should receive good-faith estimates of a derivative product's worth (Taylor 1995). Recognizing a dealer's responsibility for honest sales practices may be the first step towards implementing swift punishment for blatant violators such as Kenneth Schulte.

Also, this agreement allows the SEC to evaluate dealers' capital positions based on the disclosures made by the dealers. Such an evaluation presents problems because

dealers use proprietary models to measure and value derivative positions. The possibility that carefully developed and closely-guarded models would become public caused the securities firms initially to resist such disclosures. The agreement resolved this difficulty by allowing firms to continue to use their private models under two conditions: First, the models must adhere to certain minimum standards (negotiated with the SEC) and secondly, the firms must submit these models to outside auditors. The auditors will verify that the models are acceptable based on the negotiated standards (Taylor 1995).

However, auditing a complicated derivative transaction effectively is a challenging task. Little guidance exists for assessing the credibility of pricing models. Moreover, few guidelines exist for auditing any exotic derivative transactions. The Financial Accounting Standards Board (FASB) undertook a limited scope project in 1993 on disclosures about derivative instruments which it completed in October 1994 (Bullen and Porterfield 1994). Although this represents a first step towards better disclosure, accounting guidelines remain ambiguous. Whether accounting and the auditing function can help correct the errors of omission remains to be seen. New information and disclosures will add value only if the investor understands them.

Before implementing any new regulations in the derivatives market, the SEC, FASB, and other rule-making bodies should consider the importance of derivatives to the American economy. Derivatives play a key role in the formation of capital and risk management. In today's fast-moving marketplace, derivatives provide a much-needed flexibility for managing risk and have helped American corporations compete effectively (Smith 1994a). For example, Betsy Glaeser, manager of capital markets at Mobil

Corporation, claims her group saved approximately $4 billion "as a result of my having heard the word 'swap' in 1989" (Smith 1994a).

Furthermore, regulators should consider the involvement of several government-sponsored agencies in the derivatives market. Agencies such as the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, and the Federal Home Bank System are responsible for issuing exotic derivatives. For example, problems in the Orange County, California investment fund partially resulted from the presence of derivatives issued by FNMA (Smith 1994b). If the Wall Street dealers encounter new regulations, then the rule-making bodies can argue for tightening restrictions on the government agencies with whom the dealers work closely.

The government-sponsored agencies (such as those listed above) became involved with derivatives for several reasons. Their need for funds to finance mortgages and other loans makes them very sensitive to small differences in their cost of borrowing. Secondly, the sponsorship of the government entitles these agencies to a AAA credit rating which is attractive to investors. Also, Wall Street dealers find it simpler to use these agencies to develop exotic new debt structures because debt issues of these agencies do not have to be registered publicly (Smith 1994b).

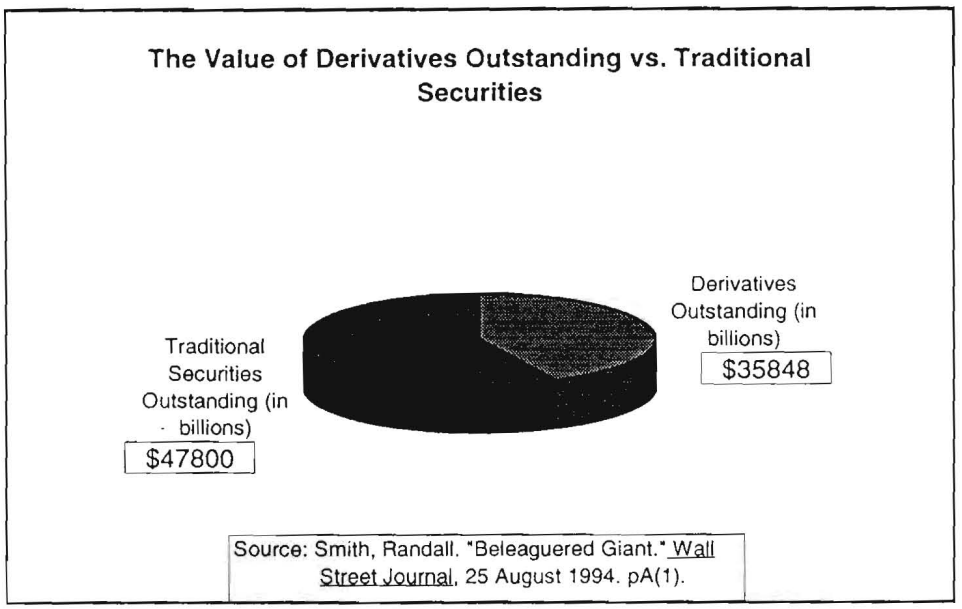
In the past, the government-sponsored agencies have relied on Wall Street and the customers to assess the suitability of the product. A spokesperson for the Federal Home Loan Bank System claims, "We believe its incumbent on investors throughout the marketplace to understand the securities they are buying" (Smith 1994b). The agencies now fear that association between their names and some of the derivatives aggressively

sold on Wall Street may provoke a regulatory backlash. Such regulation could threaten these agencies' "legal privilege" to imprint the government's name on their debt, which the spokesperson describes as, "one of our most valuable corporate assets" (Smith 1994b). Consequently, government regulators (such as the SEC) may find themselves battling Wall Street dealers as well as other government entities.

If further regulatory action is on the horizon, regulators must consider the impact new rules may have on the economies of other countries. The derivatives market is deeply intertwined with securities markets around the world and, therefore, actions in the American derivatives market have international implications. For example, over the past two years Wall Street has sold many derivatives with maturities of one to two years whose value is based on the performance of the Mexican peso (known as a peso-linked structured note). Because of the sharp devaluation of the Mexican peso in December 1994, these derivatives have declined in value and investors are rapidly selling these instruments. These swift sales continue to force the value of the peso downwards, exacerbating Mexico's current financial crisis (Vogel 1995).

With such a tremendous sphere of influence derivatives exist as a dominant international financial force. The notional value of derivatives outstanding in August 1994 exemplifies exactly how big the derivatives market has grown. Figure 6 reveals that the notional value of these instruments approximates 78% of the value of outstanding stocks, bonds, and money-market securities world-wide.

Figure 6



The derivatives market probably would not have grown to this size without the time lag between the evolution of derivatives and regulatory action. Had stringent regulations existed in the early 1980s, some of the amazing financial technology may not have occurred. According to Andrew Davidson, head of a derivatives research firm, "The concept of derivatives stems back at least to the Bible. In Genesis, God began creation by separating light from darkness. . . to limit derivatives is to limit creation" (Smith 1994b).

These financial innovations are not viscous instruments designed by Wall Street to prey upon unsophisticated investors. They are creations of financial brilliance which

were unfortunately misunderstood by many investors. Any regulatory actions appearing in the near future will likely consist of more voluntary agreements, such as the compromise between the six major Wall Street dealers and the SEC discussed above (Dontje 1995). These voluntary compromises are the best type of regulatory action the SEC could take because they place the accountability for understanding derivatives where it belongs: with the investor. The first step towards reducing the errors occurring in the derivatives market is increasing the time and care allocated to understanding derivatives. As a reminder to those prone to gambling with high-risk stakes: no amount of education, regulation, or disclosure can prevent bad luck.

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[1] For a detailed analysis of the OAS model refer to Davidson, Ho and Lim, 1994.

[2] Companies under SEC jurisdiction include those (1) whose securities are listed on a national stock exchange, or (2) with equity securities traded on the over-the-counter market, and total assets exceeding $5 million and 500 or more stockholders.

Sources Consulted

Periodicals

Achstatter, Gerad. "Used Well Derivatives are Good Business." Investor's Business Daily, 17 October 1994. p1A.

Bacon, Kenneth. "Derivatives Face New Regulation from Congress." Wall Street Journal, 11 May 1994. pA(1).

_____ "US Regulators Shift Attention to Banks' Risk." Wall Street Journal, 13 May 1994. pC(3).

Bailey,Jeff. "SEC Charges Broker in Sales of Derivatives." Wall Street Journal, 28 December 1994. pC(1).

Berton, Lee. "FASB Requires More Disclosure on Derivatives." Wall Street Journal, 6 October 1994. pA(3).

Bullen, Halsey and Laura Porterfield. "Derivative Financial Instruments: Time for Better Disclosure." The CPA Journal, July 1994. p18.

Connor, John."Bankers Trust Facing Action on Derivatives." Wall Street Journal, 5 December 1994. pA(3).

_____ "Finance Officers Say Brokers Misled Government About Risk of Derivatives." Wall Street Journal, 9 January 1995. pC(1).

"Derivatives Risk Should Be Shared, Users Survey Says." Wall Street Journal, 26 April 1995. pC(3).

Ehrbar, Alvin. "The Great Bond Market Massacre." Fortune, 17 October 1994. p77.

Goodman, Edward, ed. E&Y On the Marketplace. "Focus on Products : MBS inverse floaters." Fall 1994. p4.

"Graduate." Indiana Alumni News. Fall 1994. p5.

Graham, George. "Bankers Defend Derivatives." Financial Times, 11 May 1994. p10.

Granito, Barbara. "Alarmed, World's Central Banks Call for Full Exposure of All Risks." Wall Street Journal, 29 September 1994. pC(1).

Greenwald, John. "The Secret Money Machine." Time, 11 April 1994. p28-35.

Hanke, Steven. "Confusion of Confusion." Forbes, 26 September 1994. p136.

Hansel, Saul. "Derivatives As the Fall Guy: Excuses, Excuses." New York Times, 2 October 1994. p3(1).

Jasen, Georgette. "Derivatives Force First Closure of Money Fund." Wall Street Journal, 28 September 1994. pC(1).

Jereski, Laura. "Here's a Word for Bottom Fishers: Derivatives." Wall Street Journal,14 October 1994. pC(1)

_____"Orange County Borrowed $1 Billion Even as Its Investment Losses Piled Up." Wall Street Journal, 5 December 1994. pA(3).

_____ "Who Bears Loss Becomes Critical Orange County Issue." Wall Street Journal, 10 January 1995. pC(1).

Knecht, Bruce. " Pied Piper." Wall Street Journal, 26 August 1994. pA(1).

_____"I Owe U." Wall Street Journal, 23 September 1994. pA(1).

_____"The Lawyers' Turn." Wall Street Journal, 28 October 1994. pA(1).

_____"Derivatives Lead to Huge Loss in Public Fund." Wall Street Journal, 2 December 1994. pA(3).

_____ " Merrill Lynch's Role as Broker to Fund May Expose It to Liability." Wall Street Journal, 8 December 1994. pA(1).

_____ "Derivatives Dregs." Wall Street Journal, 20 December 1994. pA(1).

_____ "The Aftermath." Wall Street Journal, 21 March 1995. pA(1).

Lord, Anthony. "Hiring the Right Derivatives Specialist." Treasury and Risk Management, May-June 1994. p40.

Lipin, Steven. "Bankers Trust Says Gibson Greetings Was Fully Aware of Derivatives' Risk." Wall Street Journal, 13 October 1994. pA(8).

_____ "Bankers Trust Says P&G Deal Wasn't Unique." Wall Street Journal, 22 November 1994. pC(1).

_____"Bankers Trust Woes Spread to Money Unit." Wall Street Journal, 8 December 1994. pA(3).

Loomis, Carol J. "Cracking The Derivatives Case." Fortune, 20 March 1995. p50.

McGee, Suzanne. "Plain Vanilla Derivatives Can Also Be Poison." Wall Street Jounal, 21 March 1995. pC(5).

Miller, James. "Air Products Takes a Charge of $160 Million." Wall Street Journal,12 May 1994. pA(3).

Norris, Floyd. "Derivative Sales Are Down." Wall Street Journal, 12 April 1995. pC(8).

Paddock, Dorothy. "Defending Derivatives." Barron's, 10 October 1994. p20.

Paer, Terence. "Learning to Live with Derivatives." Fortune, 25 July 1994. p106.

Peltz, Michael. "Congress' Lame Assault on Derivatives." Institutional Investor, December 1994. p65.

Rose, Frederick. "Orange County Expects to Maintain Public Services." Wall Street Journal, 8 December 1994. pA(3).

Russo, Thomas. "Let Wall Street Handle the Derivatives' Rules." New York Times,15 May 1994. p3(1).

Rutchick, Joel. "SEC Takes Broker to Court Over Ohio Losses." Plain Dealer, 28 December 1994. p1(A).

Scholl, Jaye. "How Did Askin Really Collapse?" Barron's, 9 May 1994. p20.

Seligman, Paul. "Defending Critics of Derivatives." Barron's 10 October 1994. p54.

Siconolfi, Michael. "Kidder Says Review Approves the Way It Values Its Mortgage Backed Bonds." Wall Street Journal, 13 May 1994. pC(3).

Smith, Randall. "Beleaguered Giant." Wall Street Journal, 25 August1994. pA(1).

_____ "Should Agencies Share Blame for Peddling Risk?" Wall Street Journal,12 December 1994. pC(1)

Stone, Charles and Anne Zissu. "The Risks of Mortgage Backed Securities and Their Derivatives" Journal of Applied Corporate Finance, Fall 1994. p99.

Taylor, Jeff. "Bankers Trust Faces Inquiry on Derivatives Sales." Wall Street Journal,1 November 1994. pC(1)

_____ "Securities Agree to Set Controls on Derivative." Wall Street Journal, 3 March 1995. pC(1).

Thomas, Paulette. "P&G Sues Bankers Trust Over Derivatives." Wall Street Journal, 28 October 1994. pC(1).

Vogel, Thomas. "Orange County Fund Had Green Ratings Light." Wall Street Journal, 6 December 1994. pC(1).

_____ "Derivatives Darken Pall Over Mexico." Wall Street Journal, 6 January 1995. pC(1).

Webb, Sara. "Bankers Trust's Derivatives Problems Showing Signs of Spreading Overseas." Wall Street Journal, 30 November 1994. pA(4).

Welling, Kathryn. "Toxic Waste Cleanup." Barron's, 26 September 1994. p21-30.

Wiseman, Michael and Rebecca Simmons. "Derivatives: What Rocket Scientists Must Tell the Astronauts." US Banker, April 1994. p67.

Zuckerman, Laurence. "Merill Discloses It Warned Orange County." Wall Street Journal, 11 January 1995. pC(1).

Published Works

Bans, Erik. Complex Derivatives. Chicago: Probus Publishing, 1994. p3-18.

Bodie, Zvi and Alex Kane and Alan Marcus. Investments. Boston: Irwin Press, 1989. pA100.

Davidson, Andrew S., Thomas Ho, and Yung Lim. Collateralized Mortgage Obligations. Chicago: Probus Publishing, 1994. p3-103, 281-287.

Fabozzi, Frank., Charles Ramsey, and Frank Ramirez. Collateralized Mortgage Obligations. Frank Fabozzi Associates,1993. Chapter 1,2.

Klein, Robert and Jess Lederman. The Handbook of Derivatives and Synthetics. Chiago: Probus Publishing, 1994. p279-281.

Millman, Gregory. The Vandal's Crown: How Rebel Currency Traders Overthrew The World's Central Banks. New York: Free Press, 1995. p255.

Pany, Kurt and O.Ray Whittington. Auditing. Irwin: Boston, 1991. p 130-133.

Interviews

Dontje, Michael. Head of Derivatives Operations, Society KeyCorp. Interview by author, 10 February 1995, Cleveland.

Audit partner. Big Six Accounting Firm. Interview by author, 3 February 1995, Cleveland.

Exhibit I

Interview Questions

1. What exactly is your professional title and what are your primary employment responsibilities?

2. What is your educational and professional background?

3. Would you say your exposure to derivatives is slight, moderate, or significant?

4. What are the primary sort of derivatives you have exposure to?

5. Do you have experience in making decisions whether to buy or sell derivative instruments, and if so what ?

6. Which side of the buy/sell transaction do you find yourself being more involved in?

7. Why do you think many derivative investors have found themselves exposed to much more risk than they originally thought they were entering into?

8. How much analysis does your organization perform before investing in derivatives, and more specifically a CMO structure, if applicable?

9. If you were to buy a CMO, what kind of information regarding its specific risk components would you seek from the dealer of the instrument?

10. What is the most dangerous risk component of a CMO?

11. What is the best way to gauge the prepayment risk of a CMO structure?

12. How much risk information is the dealer of a CMO responsible for providing to the investor?

13. How do you think so many high-risk securities got sold?

14. Are the current derivatives problems the result of the design of the instrument or the way they have been used?

15. What do you see happening in the derivatives market as a result of the current wave of litigation?